

Application No. 10/723,397

Amendment Date June 25, 2007; Reply to Office Action of April 4, 2007

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## Amendments to the Abstract

Please replace the abstract with the following amended abstract:

### Abstract

A fast high precision matching method receives an input image and a template. An initial search method uses the input image and the template to create an initial search result output. A high precision match uses the initial search result, the input image, and the template to create a high precision match result output. The high precision match method estimates high precision parameters by image interpolation and interpolation parameter optimization. The high precision match method also performs robust matching by limiting pixel contribution or pixel weighting. An invariant high precision match method estimates subpixel position and subsampling scale and rotation parameters by image interpolation and interpolation parameter optimization on the log-converted radial-angular transformation domain.

This invention provides a fast method for high precision matching with the equivalent subpixel and subsampling interpolation in the image or template domain without actual performing the subpixel interpolation and/or subsampling. It achieves the high precision through sampling parameter optimization. Therefore, very fine sampling precision can be accomplished without the difficulty of high resolution image/template storage and expensive computation for actual matching at high resolution. This invention is generalized to include the high precision scale and rotation invariant matching through parameter optimization on log-converted radial-angular coordinate. This invention can be easily generalized to three dimensional or higher dimensional invariant high precision pattern search and can achieve even greater speed advantage comparing to the prior art methods. Therefore, it can be used in applications such as 3D medical imaging, dynamic medical imaging, confocal microscopy, live cell assays in drug discovery, or ultrasound imaging.